Table 4: Market Entry Over Time

	Percent of Total US POPs Covered							
Total Number of Providers in a County	Twelfth Report	Eleventh Report	Tenth Report	Ninth Report	Eighth Report	Seventh Report	Sixth Report	Fifth Report
3 or more	98.0%	98.0%	96.9%	96.8%	94.7%	94.1%	90.8%	87.8%
4 or more	93.6%	93.8%	93.2%	93.0%	89.3%	88.7%	84.4%	79.8%
5 or more	59.1%	50.8%	87.3%	87.5%	82.6%	80.4%	75.1%	68.5%
6 or more	20.0%	17.6%	41.3%	75.8%	71.1%	53.1%	46.7%	34.6%
7 or more	2.5%	2.4%	12.6%	29.5%	25.4%	21.2%	11.9%	4.4%

Source: Federal Communications Commission estimates.

46. There are several caveats to note when considering these data. First, to be considered as covering a county, an operator need only be offering any service in a portion of that county. Second, multiple operators shown as covering the same county are not necessarily providing service to the same portion of that county. Consequently, some of the counties included in this analysis may have only a small amount of coverage from a particular provider. Third, the figures for POPs and land area in this analysis include all of the POPs and every square mile in a county considered to have coverage.[74] Therefore, this analysis overstates the total coverage in terms of both geographic areas and populations covered.

c. Census Blocks vs. Counties

47. In the table below, we compare the results of our census block and county analyses.

Table 5: Estimated Mobile Telephone Rollouts
Counties Compared to Census Blocks

Total Number of Providers in a County	% of Total US POPs (Counties)	% of Total US POPs (Blocks)	Absolute Difference	% of Total US Square Miles (Counties)	% of Total US Square Miles (Blocks)	Absolute Difference
3 or More	98.0%	95.5%	2.5%	68.5%	39.9%	28.6%
4 or More	93.6%	89.9%	3.7%	49.9%	24.5%	25.4%
5 or More	59.1%	56.8%	2.3%	26.9%	13.3%	13.6%
6 or More	20.0%	21.8%	1.8%	8.6%	4.6%	4.0%
7 or More	2.5%	3.6%	1.1%	1.1%	0.8%	0.3%

48. The percentage of the population covered by a given number of competitors resulting from the use of a census block analysis is similar to the figure provided by a county analysis, with the absolute difference being less than a few percentage points in all cases. However, we find that there are large differences in the percentage of the geographic area covered. While the percentage of the U.S. covered by three or more providers is about 40 percent less when measured by census blocks than when measured by counties, we note that the area covered - 1.5 million square miles - is roughly the same size as the combined land area of the 25 member countries of the expanded European Union.

[74] All population figures are based on the Bureau of the Census's 2000 county population.

2. Concentration Measures for Mobile Telephone Services

49. This section reports the results of using the Herfindahl-Hirschman Index ("HHI") to measure market concentration with respect to the provision of mobile telephone services in EAs.[75] The value of the HHI reflects both the number of market competitors and the distribution of their market shares. In general, the value of the HHI declines as the number of firms increases and it increases with rising inequality among any given number of firms.[76]

50. In principle, the market shares used to calculate HHIs can be based on various output measures, such as revenues or the number of subscribers. For reasons of data availability we have elected to calculate each mobile carrier's market share based on the number of subscribers served by each carrier. The number of subscribers served by each carrier is determined based on the Commission's Numbering Resource Utilization / Forecast ("NRUF") data, which track phone number usage information for the United States.[77]

51. We use EAs as the geographic unit for measuring concentration in mobile telephone markets because an EA captures the area in which the average person shops for and purchases a mobile phone, most of the time.[78] We emphasize that, in using the EA to calculate market shares for the purposes of this report, we are not concluding that the EA is the relevant geographic market for other purposes.[79]

52. Based on NRUF data as of December 2006, the average value of the HHIs weighted by EA population is 2674, and the median value is about 2730.[80] This represents a decrease in average concentration from the weighted average value of 2706 and the median value of about 2785 estimated for

---

[75] The HHI is calculated by summing the squares of the individual market shares of all firms competing in the relevant market. When a single firm is the sole supplier in the relevant market (a pure monopoly), the HHI attains its maximum value of 10,000 (100 x 100). If there are ten providers, each with ten percent of the market, the value of HHI would be 1,000 [$(10)^2$ x 10]. As the structure of a market becomes progressively more atomistic, the value of HHI approaches 0.

[76] For example, if four carriers are identified as participants in the relevant product and geographic market and each carrier accounts for 25 percent of total sales, the value of HHI would be 2500 [$(25)^2$ x 4]. If the number of carriers increases to five, each with a 20 percent market share, the value of HHI would decline to 2000 [$(20)^2$ x 5]. On the other hand, if there are still only four carriers but the top carrier has a 40 percent market share while each of the remaining three carriers has 20 percent, the value of HHI would increase from 2500 to 2800 [$(40)^2 + (20)^2$ x 3].

[77] The methodology used to compile NRUF data is described in Section VI.B.4, Sub-National Penetration Rates, *infra*.

[78] *See* VI.B.4, Sub-National Penetration Rates, *infra*. As discussed in note 563, the use of EAs, rather than smaller geographic areas, also reduces distortions inherent in the use of NRUF data. In addition to the inherent limitations of the NRUF data detailed below, the methodology used to calculate the HHIs for EAs has its own limitations. The methodology gives equal weight to a mobile carrier that reports assigned numbers in one county as it does to a carrier that reports assigned numbers in all counties, or at least more than one county, within the EA. In effect, the methodology is based on the implicit assumption that the EA is the relevant geographic market, so that each carrier with assigned numbers in the EA is competing head to head with all other carriers operating in the EA. However, to the extent that carriers have different coverage areas that do not overlap, not all carriers with assigned numbers in an EA are in fact direct competitors. The implication is that the HHIs for EAs will tend to understate systematically the actual level of market concentration because the underlying geographic market definition is overly broad. On the other hand, there may be factors that would cause the relevant geographic market to be broader.

[79] In other contexts, such as the Commission's review of license transfers and assignments, the relevant geographic market for calculating HHIs may be greater or less than an EA.

[80] *See* Appendix A, Table A-3, *infra*. The simple mean (not weighted by population) is 3046.

December 2005.[81] As a benchmark for comparison, the value of HHI for a hypothetical market in which there are four carriers with equal market shares is 2500. The value of HHI for individual EAs ranges from a low of 1609 in EA 28 (covering parts of South Carolina and Georgia, including Savannah) to a high of 6551 in EA 121 (covering parts of Nebraska and Colorado). Approximately 35 percent of the population lives in EAs where the value of HHI is below the 2500 benchmark. Approximately 8.6 percent of the U.S. population lives in EAs where the value of HHI exceeds 3333, which would be the approximate value of HHI in a market that is equally divided among three competitors. However, there are four or more competitors in all but one of the EAs with HHIs in excess of 3333. This suggests that the relatively high HHI values in most of these EAs primarily reflect the limited effect of competitive entry to date in eroding the market shares of one or both carriers holding the two original cellular licenses, rather than simply a limited number of competitors.

53. In interpreting these HHIs, it is worth noting that the specific technological and economic characteristics of an industry are important determinants of the level of market concentration. Of particular importance is the relationship between economies of scale and the potential size of the market. In industries where the scale of output at which a firm can fully exploit scale economies (the minimum efficient scale) is large relative to potential demand, there will be room in the market for only a small number of firms operating at the lowest possible cost.

54. In light of the impact of technological and economic factors in determining the level of market concentration, it is noteworthy that the estimated values of HHIs for EAs tend to increase as the EA population declines. In other words, consistent with the theoretical considerations noted above, market concentration tends to be higher in EAs with a smaller potential subscriber base. For example, the EA with the highest HHI value (EA 121) is also the least populated EA. However, apart from differences in population size, EAs also vary significantly with regard to other important determinants of market demand and cost, including factors such as per capita income, population density, urbanization, the age distribution of the population, and the size and composition of the business sector.[82] Absent a more systematic analysis of the possible relationship between these factors and market concentration, we cannot make a determination of the extent to which market concentration in any given EA is explained by potential market demand and cost factors.

3. International Comparison of Mobile Market Concentration

55. Concentration in mobile markets abroad provides another benchmark against which to evaluate U.S. mobile market concentration. This section compares the structure of mobile telephone markets in the United States and selected countries with regard to the number of market competitors and concentration measures calculated using HHIs. We note that international differences in mobile market concentration may reflect a variety of factors, including differences in the regulatory environment.

56. As noted in the *Eleventh Report*, successive wireless mergers have made the U.S. mobile market more similar in structure to comparable mobile telephone markets in Western Europe and Asia by reducing the number of national mobile operators from six to four.[83] There are three or four national

[81] *See Eleventh Report*, at 10965.

[82] The average cost of serving a given market tends to decline with higher population density and urbanization because high concentrations of subscribers make it easier for operators to provide adequate coverage with less infrastructure deployment. *See* Eugence C. Signorini, *Wireless Coverage in the United States: Leaving a Lot to Be Desired*, THE YANKEE GROUP REPORT, Vol. 1, No. 11, Aug. 2000, at 8.

[83] *Eleventh Report*, at 10966.

mobile telephone operators in most Western European mobile markets.[84] The United Kingdom ("UK") is an exception with five national mobile operators.[85] Asian-Pacific countries of comparable income levels also generally have three or four national mobile operators.[86] The principal exception is Hong Kong, with five mobile operators.[87]

57. Apart from the number of national competitors, there are significant structural differences between mobile markets in the United States and Western Europe. In addition to the four nationwide mobile telephone operators, several large regional operators and a large number of mobile telephone operators with smaller geographic footprints compete in many regional and local markets in the United States. In contrast, because spectrum licenses in Western Europe are generally assigned on a nationwide basis,[88] national mobile operators do not, as a rule, face competition from smaller facilities-based regional providers in Western European mobile markets. In addition, as detailed above, the number of mobile competitors per market in the United States varies by region, ranging from as many as seven or more in some counties to fewer than four competitors in other counties. Nevertheless, as previously mentioned, 98 percent of the total U.S. population lives in counties with a minimum of three different mobile operators, the same as the maximum number of national mobile providers in a number of Western European markets.

58. Because Western European regulators generally awarded nationwide licenses for second-generation GSM and third-generation services, we assume for the purposes of this report that consumers' choices of mobile telephone operators are uniform throughout each country[89] and, accordingly, we measure concentration in European mobile markets on a national basis. For purposes of comparison, we computed HHIs based on subscriber shares as of the fourth quarter of 2006 for the following countries: Finland, France, Germany, Italy, the Netherlands, and the UK.[90] The least concentrated mobile market is in the UK, with an HHI of 2268. Mobile subscribers in the UK are relatively evenly divided among the four original GSM incumbents, and a fifth operator, a 3G start-up, increased its subscriber share to 5.5 percent by the end of 2006.[91] The value of HHI in the remaining countries ranges from a low of 2999 in

---

[84] *Interactive Global Wireless Matrix 4Q06*, Merrill Lynch, Telecom Services Research, available at <http://www.cwes01.com/10323/24789/Interactive_Global_Wireless_Matrix.xls> ("*Interactive Global Wireless Matrix 4Q06*").

[85] *Id.*

[86] *Interactive Global Wireless Matrix 4Q06.*

[87] *Id.* A 2006 merger between Telstra's Hong Kong mobile subsidiary CSL and rival operator New World reduced the number of mobile operators in Hong Kong from six to five. *See* Sumner Lemon, *Telstra to Merge CSL With Hong Kong's New World*, COMPUTERWORLD, Dec. 12, 2005; *Eleventh Report*, at 10967.

[88] As an exception, however, one of the third-generation spectrum licenses awarded in Finland is local. *See European Electronic Communications Regulation and Markets 2006 (12th Report)*, Commission of the European Communities, Mar. 29, 2007, at 42.

[89] In practice, available evidence indicates that network coverage varies by operator and region in European mobile markets. *See, e.g.*, Ofcom, *The Consumer Experience*, Nov. 16, 2006, at 8 (stating that 95 percent of the UK population live within postal districts that have coverage by all four 2G mobile operators, while 99.9 percent of the UK population live within postal districts that have at least one 2G mobile operator with at least 75 percent area coverage).

[90] The subscriber shares used to calculate HHIs for European mobile markets were taken from *Interactive Global Wireless Matrix 4Q06.*

[91] *Id.*

Germany to a high of 3776 in France.[92] The relatively high values of HHI in this group of countries reflect two factors. One is the small number of competitors per market, with four national operators in Germany, the Netherlands, and Italy, and three national operators in France and Finland. Second, each market tends to be dominated by the top two competitors, which have a combined market share ranging from about 72 percent in Germany, Italy, and the Netherlands to about 82 percent in France and Finland.[93] In comparison, it is estimated that the combined national market share of the top two mobile telephone service providers in the United States was 51.5 percent in the last quarter of 2006.[94]

59. Given our previous finding that the average value of HHI weighted by EA population in the U.S. mobile market is 2683 and that the median value is about 2730, it is evident that, on average, concentration is lower in the U.S. mobile market than in Western European mobile markets with the exception of the UK. Approximately 20 percent of the U.S. population lives in EAs where mobile market concentration is lower than in the UK. At the same time, approximately six percent of the U.S. population lives in EAs with higher mobile market concentration levels than France, the European country with the highest mobile market HHI among the European countries included in this comparison.

D. Consolidation and Exit

60. Consolidation and exit of service providers, whether through secondary market transactions or bankruptcy, may affect the structure of the mobile telecommunications market. A reduction in the number of competing service providers due to consolidation or exit may increase the market power of any given service provider, which in turn could lead to higher prices, fewer services, and/or less innovation. However, consolidation does not always result in a negative impact on consumers. Consolidation in the mobile telecommunications market may enable providers to achieve certain economies of scale and increased efficiencies compared to smaller operators.[95] If the cost savings generated by consolidation give the newly enlarged provider the ability and the incentive to compete more aggressively, consolidation could result in lower prices and new and innovative services for consumers.[96] Moreover, it is unlikely that competitive harm will result from consolidation among service

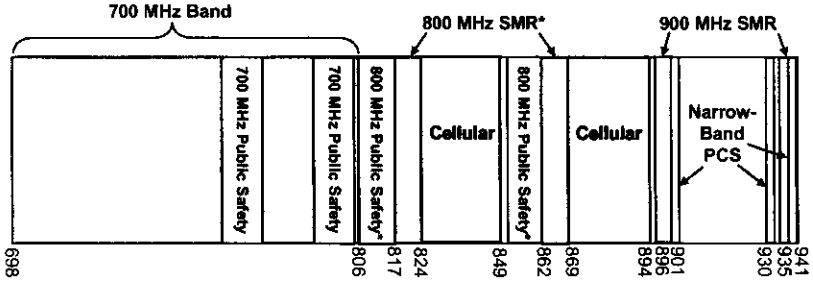
[92] The value of HHI for the countries within this range is 3741 in Finland, 3065 in Italy, and 3441 in the Netherlands.

[93] *Id.*

[94] *Interactive Global Wireless Matrix 4Q06.* However, both the identity of the top two providers and their combined market share vary significantly across regional geographic markets in the United States.

[95] *See* Section III.C.2, Concentration Measures for Mobile Telephone Services, *supra*, and Section 0,

698-941 MHz: Narrowband PCS Spectrum



Non-Regulatory Barriers to Entry, *infra*, for a fuller discussion of how economies of scale may affect market structure.

[96] *See* Jonathan B. Baker, *Developments in Antitrust Economics*, JOURNAL OF ECONOMIC PERSPECTIVES, Vol. 13, No. 1, Winter 1999, at 182.

providers licensed to operate in separate geographic markets.

61. As noted previously, currently there are four nationwide facilities-based mobile telephone providers in the United States.[97] In many cases, these carriers built nationwide footprints[98] through various forms of transactions.[99] Many nationwide operators continue to seek to fill in gaps in their coverage areas, as well as to increase the capacity of their existing networks. As the Commission has previously concluded, operators with larger footprints can achieve certain economies of scale and increased efficiencies compared to operators with smaller footprints.[100] Since the writing of the *Eleventh Report*, a number of transactions between market participants have been completed or announced. We discuss the largest of these transactions below.

1. Sales and Swaps

62. *Alltel Acquisition by TPG Capital and GS Capital Partners* – On May 20, 2007, Alltel announced that it had signed a merger agreement to be acquired by TPG Capital and GS Capital Partners ("GSCP"), in a transaction valued at approximately $27.5 billion.[101] Under the terms of the merger agreement, TPG Capital and GSCP will acquire all of the outstanding common stock of Alltel for $71.50 per share in cash.[102] The purchase price per share represents a 23 percent premium over Alltel's closing share price prior to media reports of a potential transaction published on December 29, 2006.[103] The Commission consented to the merger on October 26, 2007.[104]

63. *Alltel / Midwest Wireless* – On October 3, 2006, Alltel completed its previously announced plan to purchase Midwest Wireless, a privately-held company, for $1.075 billion in cash.[105] With the purchase, Alltel gained approximately 450,000 wireless subscribers in southern Minnesota, northern and eastern Iowa, and western Wisconsin.[106] According to Alltel president and CEO Scott Ford, "The addition of Midwest Wireless bolsters Alltel's position in the wireless industry by adding CDMA properties that are contiguous to our existing markets in the Midwestern U.S."[107]

---

[97] *See* Section III.B.1, Facilities-Based Mobile Telephone Providers, *supra*.

[98] Generally, "footprint" is an industry term of art referring to the total geographic area in which a wireless provider offers service or is licensed to offer service.

[99] The Commission must consent to the transfer of control or assignment of all non pro-forma spectrum licenses used to provide wireless telecommunications services. 47 C.F.R. § 1.948.

[100] *See Seventh Report*, at 12997. One study found bigger companies get better equipment prices because of their size. Shawn Young, *As Wireless Firms Grow, So Can Costs*, WALL STREET JOURNAL, Apr. 29, 2004, at B4. However, the study also found that the cost of signing up new customers increases as wireless companies get bigger.

[101] *Alltel to be Acquired by TPG Capital and GS Capital Partners for $71.50 per Share*, News Release, Alltel, May 20, 2007.

[102] *Id.*

[103] *Id.*

[104] In the Matter of Applications of ALLTEL Corporation, Transferor, and Atlantis Holdings LLC, Transferee For Consent To Transfer Control of Licenses, Leases and Authorizations, *Memorandum Opinion and Order*, 22 FCC Rcd 19517 (2007).

[105] *Alltel completes purchase of Midwest Wireless,* News Release, Alltel, Oct. 3, 2006. *See, also*, Applications of Midwest Wireless Holdings, L.L.C. and ALLTEL Communications, Inc., WT Docket No. 05-339, *Memorandum Opinion and Order*, 21 FCC Rcd 11526 (2006).

[106] *Alltel Completes Purchase of Midwest Wireless,* News Release, Alltel, Oct. 3, 2006.

[107] *Id.*

64. *AT&T / Aloha* – On October 9, 2007, AT&T announced an agreement to purchase spectrum licenses in the 700 MHz band from Aloha.[108] AT&T agreed to pay approximately $2.5 billion in cash for the licenses, which consists of 12 megahertz of spectrum covering 196 million people in 281 markets.[109] According to the company, the spectrum covers many major metropolitan areas, including 72 of the top 100 and all of the top 10 markets in the United States.[110]

65. *AT&T / Dobson* – On June 29, 2007, AT&T announced that it would acquire Dobson Communications Corporation ("Dobson") for approximately $2.8 billion in cash.[111] Dobson, with 1.7 million subscribers, markets wireless service under the Cellular One brand name.[112] Dobson's GSM network covers rural and suburban areas in Alaska, Arizona, Illinois, Kansas, Kentucky, Maryland, Michigan, Minnesota, Missouri, New York, Ohio, Oklahoma, Pennsylvania, Texas, Virginia, West Virginia and Wisconsin.[113] Through the acquisition, AT&T expects to realize significant annual savings in reduced roaming expenses, as well as cost savings for the combined companies in areas such as overhead and operations.[114] According to Randall L. Stephenson, chairman and CEO of AT&T, "The combination of our two companies also will create value for AT&T's stockholders . . . [by bringing] two key assets – Dobson's 1.7 million customers and its strong, compatible network – to AT&T, delivering both growth and cost savings opportunities."[115]

66. *Sprint Nextel / Northern PCS* – On June 13, 2007, Sprint Nextel announced an agreement to acquire Northern PCS Services, LLC ("Northern PCS"), one of its few remaining affiliates, for $312.5 million, including the assumption of debt.[116] The company completed the acquisition on August 2, 2007.[117] Northern PCS, based in Minnesota, provided Sprint PCS services in small to mid-size markets in Minnesota, North Dakota, Wisconsin and Iowa, serving more than 167,000 direct wireless subscribers and more than 69,000 reseller subscribers in a coverage area of more than 1.8 million people.[118] It employed about 240 people and had revenues for the twelve months ended December 31, 2006 of $130 million.[119] With the acquisition of Northern PCS, Sprint Nextel has three remaining independent wireless affiliates: iPCS, Shentel, and Swiftel.[120]

---

[108] *AT&T Acquires Wireless Spectrum from Aloha Partners*, News Release, AT&T, Oct. 9, 2007

[109] *Id.*

[110] *Id.*

[111] *AT&T to Acquire Dobson Communications, Expand Wireless Coverage*, News Release, Dobson, Jun. 29, 2007.

[112] *Id.*

[113] *Id.*

[114] *Id.*

[115] *Id.*

[116] *Sprint Nextel to Acquire Affiliate Northern PCS*, News Release, Sprint Nextel, Jun. 13, 2007.

[117] *Sprint Nextel Concludes Acquisition of Affiliate Northern PCS*, News Release, Sprint Nextel, Aug. 2, 2007.

[118] *Sprint Nextel to Acquire Affiliate Northern PCS*, News Release, Sprint Nextel, Jun. 13, 2007.

[119] *Id.*

[120] As of November 2004, there were 12 Sprint affiliates, including Alamosa Holdings Inc., US Unwired Inc., AirGate PCS Inc., UbiquiTel Inc., Horizon PCS Inc., Shenandoah Telecommunications Co., Enterpise Wireless, Gulf Coast Wireless, iPCS Inc, Independent Wireless One (IWO), Northern PCS, and Swiftel. Phil Cusick and Richard Choe, *Airgate PCS Inc.*, Bear Stearns, Equity Research, Nov. 24, 2004, at 19. In February 2005, Alamosa completed its acquisition of AirGate, while iPCS completed its acquisition of Horizon PCS in July. *Alamosa Closes* (continued....)

67. *T-Mobile / SunCom* – On September 17, 2007, T-Mobile and SunCom Wireless Holdings, Inc. ("SunCom") announced that they had entered into a definitive merger agreement for the acquisition by T-Mobile of all of the outstanding shares of common stock of SunCom, for approximately $1.6 billion in cash and another $0.8 billion in assumed debt.[121] SunCom operates a GSM/GPRS/EDGE network in North Carolina, South Carolina, Tennessee, Georgia, Puerto Rico and the U.S. Virgin Islands. The company has provided roaming service to T-Mobile in these markets since 2004.[122] At the end of the second quarter of 2007, SunCom had more than 1.1 million customers.[123]

68. Robert Dotson, president and chief executive officer of T-Mobile, claimed that the acquisition "will round out our domestic footprint, allowing us to serve 98 of the top 100 markets, and will significantly benefit our financial position by reducing roaming expense."[124] According to T-Mobile, the company expects to realize synergies with a net present value of approximately $1 billion through reduced roaming and operating expenses.[125] The company also expects further upside growth opportunities through the addition of new markets.[126]

69. *Verizon Wireless / Rural Cellular* - On July 30, 2007, Verizon Wireless announced that it has entered into an agreement to acquire Rural Cellular Corporation ("Rural Cellular") for approximately $2.67 billion in cash and assumed debt.[127] As of March 31, 2007, Rural Cellular's network served 716,000 customers, under the Unicel brand, in 5 regional markets (Central, Midwest, Northeast, South and Northwest) covering 15 states.[128] According to the company, the combination will increase Verizon Wireless's coverage by 4.7 million licensed pops. Rural Cellular currently utilizes both CDMA and GSM technology separately across its markets.[129] While it plans to deploy CDMA service in Rural Cellular's existing GSM markets and convert the GSM customers to CDMA service, Verizon Wireless anticipates maintaining the existing GSM networks to provide roaming services to other GSM providers' customers.[130] Verizon Wireless expects to realize more than $1 billion in cost savings through reduced roaming and operations expenses.[131]

(Continued from previous page)
Acquisition of AirGate PCS, News Release, Alamosa, Feb. 15, 2005; *iPCS Announces Closing of Merger with Horizon PCS*, News Release, iPCS, July 1, 2005. Sprint Nextel completed its acquisition of Nextel Partners in June 2006 and of UbiquiTel in July 2006. *Sprint Nextel Completes Acquisition of Nextel Partners*, News Release, June 26, 2006; *Sprint Nextel Completes Acquisition of Wireless Affiliate UbiquiTel Inc.*, News Release, July 1, 2006. For a discussion of why Sprint Nextel has been acquiring its affiliates, *see Eleventh Report*, at 10969, note 112, as well as *Eleventh Report*, at 10970.

[121] *T-Mobile Agrees to Acquire SunCom Wireless to Expand Network and Industry-Leading Customer Service to the Southeastern United States, Puerto Rico and U.S. Virgin Islands*, News Release, T-Mobile, Sept. 17, 2007.

[122] *Id.*

[123] *Id.*

[124] *Id.*

[125] *Id.*

[126] *Id.*

[127] *Verizon Wireless to Acquire Rural Cellular Corporation, Expand the Nation's Most Reliable Wireless Network*, News Release, Verizon Wireless, Jul. 30, 2007.

[128] *Id.*

[129] *Id.*

[130] *Id.*

[131] *Id.*

E. Entry Conditions and Potential Barriers to Entry

70. Market concentration is necessary but not sufficient for unilateral or coordinated anti-competitive behavior to occur. If entry into a market is easy, then entry or the threat of entry may prevent incumbent operators from exercising market power, either collectively or unilaterally, even in highly concentrated markets.[132] The ease or difficulty of entry generally depends on the nature and significance of entry barriers. Barriers to entry in the mobile telecommunications market may include government regulation of access to spectrum and various non-regulatory entry barriers such as economies of scale. In the following sections, we first address access to spectrum, and then discuss potential non-regulatory barriers to entry.

1. Spectrum Access

71. In this section we first discuss the impact of the Commission's spectrum management policies on entry conditions in the mobile telecommunications market. We then provide an analysis of the outcomes of recent auctions, highlighting the growing number of licensees with near nationwide spectrum footprints. Finally, we identify and discuss the various spectrum bands that can be used for the provision of CMRS.

a. Spectrum Policy and Entry Conditions

72. Government control of spectrum allocation and assignment has the potential to create a barrier to entry into markets for mobile communications services by limiting the amount of spectrum allocated to CMRS and by requiring providers to obtain a government-issued license in order to use such spectrum for the provision of CMRS.[133] However, the Commission has helped to reduce any potential entry-limiting effects of government-controlled spectrum allocation and assignment through various policies. First, as discussed in greater detail below, the Commission has progressively increased the amount of spectrum available for the provision of CMRS. For example, the allocation of 120 megahertz of spectrum to broadband PCS and the assignment of broadband PCS spectrum licenses through auction ended the cellular duopoly by facilitating the entry of new mobile telephone service providers. More recently, the auction of licenses for spectrum allocated to AWS raised the total amount of spectrum available for CMRS by an additional 90 megahertz. Moreover, the current transition of the BRS/EBS spectrum band and the upcoming auction of commercial spectrum in the 700 MHz band will further increase the amount of spectrum available for CMRS. The impact of the AWS auction, BRS/EBS transition, and 700 MHz band on spectrum-related entry barriers is analyzed in the following section.

73. Second, the Commission has progressively implemented a more flexible, market-oriented model of spectrum allocation and assignment for spectrum used to provide commercial mobile services. For example, initially spectrum policy restricted the use of cellular spectrum to analog service and created an absolute barrier to entry by limiting the number of cellular entrants to two in each local market. In contrast, as detailed below, current policy affords licensees greater flexibility to decide what services to offer and what technologies to deploy on cellular spectrum, as well as other spectrum used for the provision of CMRS, and allows market forces to play a greater role in determining the number of entrants in each local market for mobile telephone service.

74. Finally, subject to the Commission's approval, CMRS licensees are allowed to buy and

---

[132] *See DOJ/FTC Guidelines* at §3.0; *see also* Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization* (3rd ed.), Addison, Wesley, Longman, Inc., 1999, at 77.

[133] *See, e.g.*, Thomas W. Hazlett, *The Wireless Craze, The Unlimited Bandwidth Myth, The Spectrum Auction Faux Pas, and the Punchline to Ronald Coase's "Big Joke"*, Working Paper 01-01, AEI-Brookings Joint Center for Regulatory Studies, Jan. 2001; *Spectrum Framework Review: Implementation Plan*, Consultation Document, Office of Communications, Jan. 13, 2005, at 77 and 81-82.

sell licenses, in whole or in part, on the secondary market. As noted in the *Ninth Report*, beginning in 2003 the Commission also allowed CMRS licensees to lease all or a portion of their spectrum usage rights for any length of time within the license term, and over any geographic area encompassed by the license.[134] The cumulative effect of these flexible, market-oriented spectrum policies has been to help reduce any entry barriers that may arise from government regulation of spectrum.

b. Recent Spectrum Auctions

75. The results of the recent auctions indicate that the Commission's spectrum allocation and assignment policies have helped minimize spectrum-related entry barriers. In the Commission's first auction of spectrum for AWS that closed in September 2006 (Auction 66), major cable companies were able to acquire spectrum licenses needed to enter the market for wireless services. New entrant SpectrumCo LLC ("SpectrumCo"), which is owned by several cable companies,[135] acquired non-overlapping spectrum licenses covering approximately 275 million people, giving it a near-nationwide spectrum footprint.[136] As noted in a subsequent section of this report, T-Mobile, an independent nationwide provider, acquired the spectrum licenses it needs to launch a wireless broadband network.[137] In addition, a number of smaller incumbent carriers – including Leap, MetroPCS Communications, Inc. ("MetroPCS"), and Cincinnati Bell, Inc. ("Cincinnati Bell") – acquired licenses enabling them to expand the geographic coverage of their spectrum holdings significantly and thereby gain entry into new regional markets.[138] Similarly, a number of new entrants – such as Qualcomm – were able to acquire spectrum licenses in the Commission's first several auctions of spectrum licenses in the Lower 700 MHz band from 2002 to 2005 (Auctions 44, 49, and 60), and Qualcomm's spectrum acquisitions in the Lower 700 MHz band have given it a nationwide spectrum footprint.[139] A map of nationwide spectrum licensees can be found in Appendix B.

76. The demonstrated ability of new entrants to acquire nationwide or near-nationwide spectrum footprints in these auctions, as well as the ability of incumbent regional service providers to expand their spectrum footprints, undermines claims that the Commission's auction design enables the leading nationwide carriers to prevent entry of another nationwide player.[140] More generally, these auction outcomes support the notion that spectrum allocation and assignment policies do not create an

---

[134] *Ninth Report*, at 20631.

[135] The cable company owners of SpectrumCo are Comcast, Time Warner, Cox, and Bright House. Incumbent carrier Sprint Nextel also has a 5 percent ownership stake in SpectrumCo, but in August 2007 Sprint Nextel announced that it was exercising its right to withdraw from the SpectrumCo consortium. *See Sprint Nextel to Withdraw From SpectrumCo Joint Venture*, TRDAILY, Aug. 3, 2007.

[136] *See* Auction of Advanced Wireless Services Closes: Winning Bidders Announced for Auction 66, *Public Notice*, 21 FCC Rcd 10521 (2006). SpectrumCo did not acquire spectrum covering Alaska, Montana, North Dakota, much of South Dakota, most of Colorado, or much of western Texas.

[137] *See* Section IV.B.1.c, Technology Choices and Upgrades of Mobile Telephone Providers, *infra*.

[138] *Id.*

[139] Lower 700 MHz Band Auction Closes, *Public Notice*, 17 FCC Rcd 17272 (2002); Lower 700 MHz band Auction Closes, *Public Notice*, 18 FCC Rcd (2003); Auction of Lower 700 MHz Band Licenses Closes, *Public Notice*, 20 FCC Rcd 13424 (2005).

[140] *See, eg.*, Andzeg Skrzypacz and Robert Wilson, *The Design of the 700 MHz Spectrum Auction: An Opportunity to Promote Competition and Public Safety*, May 23, 2007; Peter Cramton, Andrzej Skrzypacz, and Robert Wilson, *Auction Revenues in the 700 MHz Spectrum Auction*, June 27, 2007. If nationwide, incumbent wireless service providers were intent on acquiring spectrum solely to foreclose new entry, they would not have allowed SpectrumCo LLC to acquire a near-nationwide footprint in the AWS auction.

effective barrier to entry into the U.S. mobile telecommunications market.

Table 6: Footprint Expansion as a Result of Auction 66

Carrier	New Non-Overlapping Pops Added in Auction 66
Cable Companies bidding as SpectrumCo LLC	275 million
MetroPCS (MetroPCS AWS, LLC)	82 million
Leap Wireless (Cricket Licensee (Reauction), Inc.)	76 million
T-Mobile (T-Mobile License LLC)	20 million
Dobson Communications (American Cellular Corporation)	10 million
Cincinnati Bell (Cincinnati Bell Wireless LLC)	4 million

Notes: In this analysis, Pops are based on Census estimated 2005 population counts. Census 2000 population counts were used for U.S. Island Area since 2005 estimates were not available.

Table 7: Nationwide Terrestrial Spectrum Holders[141]
Total Footprint including Results of AWS and Lower 700 MHz Auctions

Facilities-Based Nationwide Service Providers	Nationwide Spectrum Holders			
	By Population (More than 100 million licensed pops)		By Geography (More than 1 million sq. mi. licensed pops)	
AT&T	AT&T	285 million	AT&T	3.6 million
Sprint Nextel	Sprint Nextel	285 million	Sprint Nextel	3.6 million
T-Mobile	T-Mobile	285 million	T-Mobile	3.6 million
Verizon Wireless	Verizon Wireless	279 million	Verizon Wireless	2.9 million
	Aloha	171 million	Aloha	1.0 million
	Leap Wireless	176 million	Leap Wireless	2.2 million
	MetroPCS	137 million	MetroPCS	1.1 million
	Qualcomm	285 million	Qualcomm	3.6 million
	SpectrumCo	261 million	SpectrumCo	2.3 million
			Alltel	1.9 million
			Nextwave	1.6 million
			Dobson	1.0 million

c. Spectrum Bands Potentially Available for Terrestrial CMRS

77. Currently, mobile telephone operators primarily use three types of spectrum licenses to provide mobile voice and, in most cases, mobile data services: cellular, broadband PCS, and SMR.[142] Initially, the Commission authorized up to eight different mobile telephone licenses (two cellular and six broadband PCS) in every geographical area of the country.[143] In addition, there are other bands – including, 700 MHz, 1710-1755/2110-2155 MHz (AWS-1), 2500-2690 MHz (BRS/EBS), 2.3 GHz (WCS), 1670-1675 MHz, and 901-902 MHz (Narrowband PCS) – that are licensed under the Commission's flexible Part 27 or Part 24 rules and can be used to provide CMRS services.[144] Under Commission rules, many licensees may disaggregate (divide the spectrum into smaller amounts of bandwidth) or partition (divide the license into smaller geographical areas) their licenses, or both, to other entities.[145] Many licensees hold more than one license in a particular market.[146] We discuss in more

[141] FCC estimates.

[142] *See* Appendix B, Table B-1, and Maps B-46 to B-50, *infra*, for descriptions and maps of various geographical licensing schemes employed by the Commission.

[143] As a result of partitioning and disaggregation, there often are more than eight cellular and broadband PCS licenses in a market. However, in a few areas, there may be fewer than eight active licenses because certain auction winners or licensees have defaulted on payments to the Commission, because some licensees did not meet their buildout requirements, some licensees returned their licenses, or some licenses remained unsold in an auction.

[144] The discussion in this report is to be distinguished from the identification of the relevant spectrum input markets in the context of the Commission's review of individual wireless license transfers and assignments. For example, in wireless transactions, the Commission includes, in its evaluation of potential competitive harm, spectrum in particular bands that is "suitable" for the provision of services in a relevant product market, such as mobile telephony services. *See* Applications of AT&T Inc. and Dobson Communications Corporation, WT Docket No. 07-153, *Memorandum Opinion and Order*, FCC 07-196, at 17 ¶ 26 (rel. Nov. 19, 2007) ("[S]uitability is determined by whether the spectrum is capable of supporting mobile service given its physical properties and the state of equipment technology, whether the spectrum is licensed with a mobile allocation and corresponding service rules, and whether the spectrum is committed to another use that effectively precludes its uses for mobile telephony.")

[145] 47 C.F.R. §§ 27.15.

detail below spectrum bands potentially available for terrestrial CMRS. Band plan diagrams for each spectrum band depict where the frequencies are located. Spectrum described in this section may be used for a variety of CMRS products including narrowband data services as well as mobile telephony, broadband data and mobile video services. In addition to the 643 megahertz of terrestrial spectrum described in this section, there is an additional 157.7 megahertz of mobile satellite spectrum available for CMRS voice and data services.

Table 8: Spectrum Bands Potentially Available for Terrestrial CMRS

Spectrum Band	Megahertz
Cellular	50
SMR*	14
Broadband PCS	120
1910-15/1990-95 MHz**	10
700 MHz	84
AWS-1	90
AWS – II & III***	40
BRS/EBS****	194
WCS	30
1670-1675 MHz	5
Narrowband Spectrum	6
Total	643

* Post 800 MHz Band Reconfiguration ESMR spectrum at 817-824 MHz and 862-869 MHz.
** Held by Sprint Nextel as a result of the 800 MHz Band Reconfiguration.
*** These bands have been designated for AWS.
**** BRS/EBS spectrum is calculated based on the post-transition band plan described in 47 C.F.R. §27.5(i)(2). EBS licenses must be held by educational institutions; however, EBS licensees can lease a significant portion of their spectrum to commercial operators.

(i) Cellular

78. The Commission began licensing commercial cellular providers in 1982 and completed licensing the majority of operators by 1991. The Commission divided the United States and its possessions into 734 cellular market areas ("CMAs"), including 305 Metropolitan Statistical Areas ("MSAs"), 428 Rural Service Areas ("RSAs"), and a market for the Gulf of Mexico.[147] Two cellular

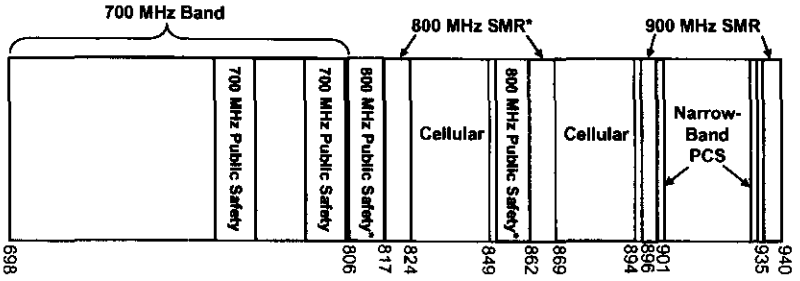
(Continued from previous page)

[146] While no longer in operation, at one time the Commission's CMRS spectrum cap restricted the distribution of certain spectrum licenses. Under the spectrum cap, no entity could control more than 45 megahertz of cellular, broadband PCS, and SMR spectrum in an MSA, or more than 55 megahertz in an RSA. In November 2001, however, the Commission decided to raise the spectrum cap to 55 megahertz in all markets effective February 13, 2002, and to eliminate the restriction entirely effective January 1, 2003. *See* 67 Fed. Reg. 1626 (Jan. 14, 2002).

[147] Under the original cellular licensing rules, one of the two cellular channel blocks in each market (the B block) was awarded to a local wireline carrier, while the other block (the A block) was awarded competitively to a carrier other than a local wireline incumbent. After awarding the first 30 MSA licenses pursuant to comparative hearing rules, the Commission adopted rules in 1984 and 1986 to award the remaining cellular MSA and RSA licenses through lotteries. By 1991, lotteries had been held for every MSA and RSA, and licenses were awarded to the lottery winners in most instances. In some RSA markets, however, the initial lottery winner was disqualified from receiving the license because of a successful petition to deny or other Commission action. Implementation of Competitive Bidding Rules to License Certain Rural Service Areas, *Report and Order*, 17 FCC Rcd 1960, 1961-1962 (2002). In 1997, the Commission auctioned cellular spectrum in areas unbuilt by the original cellular licensees. *See* FCC, *Auction 12: Cellular Unserved* (visited Apr. 12, 2002) <http://wireless.fcc.gov/auctions/12/>. (continued....)

systems were licensed in each market area. The Commission designated 50 megahertz of spectrum in the 800 MHz frequency band for the two competing cellular systems in each market (25 megahertz for each system). Initially, cellular systems offered service using analog technology, but today most of the service offered using cellular spectrum is digital.[148]

698-940 MHz: Cellular Spectrum



(ii) Broadband PCS

79. Broadband PCS is similar to cellular service, except that broadband PCS systems operate in different spectrum bands and have been designed from the beginning to use a digital format. Broadband PCS licenses have been assigned through auction, beginning in 1995.[149] The Commission has set aside the spectrum between 1850 MHz and 1990 MHz for broadband PCS. This spectrum includes 120 megahertz used for mobile telephone services, divided originally into three blocks of 30 megahertz each (blocks A, B, and C) and three blocks of 10 megahertz each (blocks D, E, and F).[150] Two of the 30 megahertz blocks (A and B blocks) are assigned on the basis of 51 Major Trading Areas ("MTAs").[151] One of the 30 megahertz blocks (C block)[152] and all three of the 10 megahertz blocks are assigned on the basis of 493 Basic Trading Areas ("BTAs").[153]

(Continued from previous page)
In 2002, the Commission auctioned three RSA licenses where the initial lottery winner had been disqualified. *See* FCC, *Auction 45: Cellular RSA* (visited Jun. 7, 2002) <http://wireless.fcc.gov/auctions/45/>.

[148] *See* Section VI.B.1, Subscriber Growth, *infra*.

[149] The first auction was for two license blocks of 30 megahertz each. FCC Grants 99 Licenses for Broadband Personal Communications Services in Major Trading Areas, *News Release*, FCC, Jun. 23, 1995. The Commission has since had numerous additional broadband PCS auctions. *See* FCC, *Auctions Home* (visited Oct 1, 2007) <http://wireless.fcc.gov/auctions/>. Three licenses were also awarded as part of a pioneer preference program in 1994. Three Pioneer Preference PCS Applications Granted, *News Release*, FCC, Dec. 14, 1994.

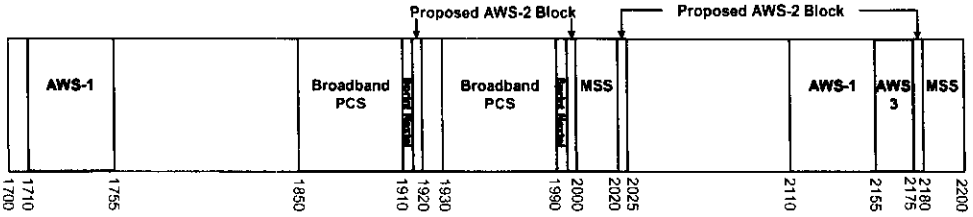
[150] Initially, the Commission's broadband PCS allocation included 20 megahertz of spectrum at 1910 MHz - 1930 MHz for unlicensed broadband PCS. 10 megahertz has since been allocated on a nationwide basis to Sprint Nextel. *See* Improving Public Safety Communications in the 800 MHz Band, *Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order,and Order*, 19 FCC Rcd. 14969, 15083 (2004).

[151] Major Trading Areas are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an arrangement with the Federal Communications Commission. Rand McNally's MTA specification contains 47 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission has added three MTA-like areas: Guam and the Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands, and American Samoa. In addition, Alaska was separated from the Seattle MTA into its own MTA-like area. MTAs are combinations of two or more BTAs.

[152] The Commission has also reconfigured returned C block licenses. *See Tenth Report*, at 15935, note 150.

[153] Basic Trading Areas ("BTAs") are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an agreement with the Federal Communications (continued....)

1700-2200 MHz: Broadband PCS Spectrum



(iii) SMR

80. The Commission first established SMR in 1979 to provide for land mobile communications on a commercial basis. The Commission initially licensed spectrum in the 800 and 900 MHz bands for this service, in non-contiguous bands, on a site-by-site basis.[154] The Commission has since licensed additional SMR spectrum through auctions.[155] In total, the Commission has licensed 19 megahertz of SMR spectrum, plus an additional 7.5 megahertz of spectrum that is available for SMR as well as other services.[156] While Commission policy permits flexible use of this spectrum, including the provision of paging, dispatch, mobile voice, mobile data, facsimile, or combinations of these services,[157]

(Continued from previous page)
Commission. BTAs are geographic areas drawn based on the counties in which residents of a given BTA make the bulk of their shopping goods purchases. Rand McNally's BTA specification contains 487 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission added additional BTA-like areas for: American Samoa; Guam; Northern Mariana Islands; San Juan, Puerto Rico; Mayagüez/Aguadilla-Ponce, Puerto Rico; and the U.S. Virgin Islands.

[154] The "900 MHz" SMR band refers to spectrum allocated in the 896-901 and 935-940 MHz bands; the "800 MHz" band refers to spectrum allocated in the 806-824 and 851-869 MHz bands. *See* 47 C.F.R. § 90.603; *see also* 47 C.F.R. § 90.7 (defining "specialized mobile radio system").

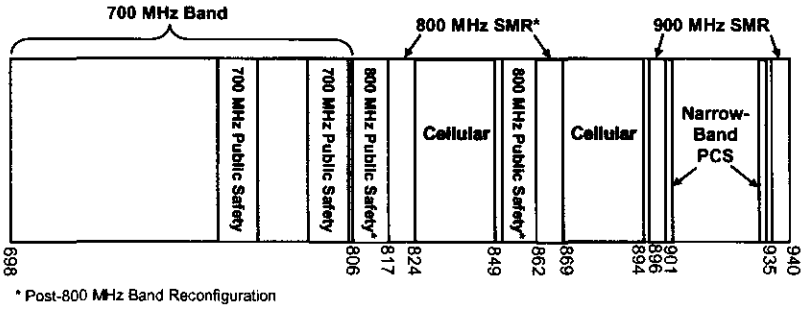
[155] The Commission has held multiple auctions for SMR licenses. FCC, *FCC Auctions* (visited July. 7, 2007) <http://wireless.fcc.gov/auctions/>.

[156] There are five megahertz in the 900 MHz band (200 paired channels x 12.5 kHz/channel). *See* 47 C.F.R. § 90.617, Table 4B. There are 21.5 megahertz in the 800 MHz band: 14 megahertz in the 800 SMR Service (280 paired channels x 25 kHz/channel) and 7.5 megahertz in the 800 MHz General Category (150 paired channels x 25 kHz/channel). *See* 47 C.F.R. § 90.615, Table 1 (SMR General Category) and 47 C.F.R. § 90.617, Table 4A (SMR Service). In 2000, the Commission amended its rules to allow Business and Industrial/Land Transportation licensees in the 800 MHz band to use their spectrum for CMRS operations under certain conditions. Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies; Establishment of Public Service Radio Pool in the Private Mobile Frequencies Below 800 MHz; Petition for Rule Making of The American Mobile Telecommunications Association, *Report and Order and Further Notice of Proposed Rule Making*, 15 FCC Rcd 22709, 22760-61 (2000). This could make up to five megahertz of additional spectrum available for digital SMR providers: 2.5 megahertz in the Industrial/Land Transportation Category (50 paired channels x 25 kHz/channel) and 2.5 megahertz in the Business Category (50 paired channels x 25 kHz/channel). *See* 47 C.F.R. § 90.617, Tables 2A and 3A. As discussed below in Section III.E.1.b, *infra*, the configuration of the 800 MHz band is changing as a result of a new band plan adopted by the Commission.

[157] Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium, *Policy Statement*, 14 FCC Rcd 19868 (1999); *see also* Applications of Various Subsidiaries and Affiliates of Geotek Communications, Inc., Debtor-In-Possession, Assignors, and Wilmington Trust Company or Hughes Electric Corporation, Assignees, For Consent to Assignment of 900 MHz Specialized Mobile Radio Licenses, *Memorandum Opinion and Order*, 15 FCC Rcd 790, 802 (2000).

the primary use for SMR traditionally was dispatch services.[158] With the development of digital technologies that increased spectral efficiency, SMR providers such as Sprint Nextel (on its iDEN network) and SouthernLINC Wireless, a unit of energy concern Southern Company, became more significant competitors in mobile telephony, while also maintaining dispatch functionality as a part of their service offerings. Furthermore, in apparent response to the dispatch functionality of SMR services, many cellular and broadband PCS providers now offer push-to-talk ("PTT") functionality on their networks, including Verizon Wireless, AT&T, and Alltel. SMR spectrum is also used for certain data-only networks.[159]

698-940 MHz: SMR Spectrum



(a) 800 MHz Band Reconfiguration and 1.9 GHz Spectrum Exchange

81. On July 8, 2004, the Commission adopted a new band plan for the 800 MHz band to resolve the problem of interference to public safety radio systems operating in the band from CMRS providers operating systems on channels in close proximity to those utilized by public safety entities.[160] The new band plan addresses the root cause of the interference problem by separating generally incompatible technologies, with the costs of relocating 800 MHz incumbents to be paid by Sprint Nextel. To accomplish the reconfiguration, the Commission required Sprint Nextel to give up rights to certain of its licenses in the 800 MHz band and all of its licenses in the 700 MHz band. In exchange, the Commission modified Sprint Nextel's licenses to provide the right to operate on two five-megahertz blocks in the 1.9 GHz band – specifically 1910-1915 MHz and 1990-1995 MHz – conditioned on Sprint Nextel fulfilling certain obligations specified in the Commission's decision. As a new entrant in the 1.9 GHz band, Sprint Nextel is also obligated to fund the transition of incumbent users to comparable facilities. The Commission determined that the overall value of the 1.9 GHz spectrum is $4.8 billion, less the cost of relocating incumbent users. In addition, the Commission decided to credit to Sprint Nextel the value of the spectrum rights that Sprint Nextel is relinquishing and the actual costs Sprint Nextel incurs to relocate all incumbents in the 800 MHz and 1.9 GHz bands. To the extent that the total of these combined credits is less than the assessed value of the 1.9 GHz spectrum rights, Sprint Nextel will make an anti-windfall payment equal to the difference to the United States Department of the Treasury at the conclusion of the relocation process.

---

[158] Dispatch services allow two-way, real-time, voice communications between fixed units and mobile units (*e.g.*, between a taxicab dispatch office and a taxi) or between two or more mobile units (*e.g.*, between a car and a truck). *See Fifth Report*, at 17727-17728, for a detailed discussion. Dispatch and SMR are often used interchangeably, although SMR refers to specific spectrum ranges.

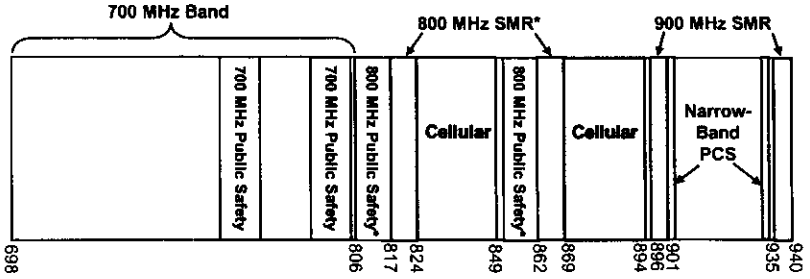
[159] *See* Section IIIV.B.1.f, Narrowband Data Networks and Technology Deployment, *infra.*

[160] FCC Adopts Solution to Interference Problem Faced by 800 MHz Public Safety Radio Systems, *News Release*, Federal Communications Commission, Jul. 8, 2004.

(iv) 700 MHz Bands

82. The 698-806 MHz band (the "700 MHz band") is being reclaimed from use by broadcast services in connection with the transition of the analog television service to digital television ("DTV").[161] The Digital Television Transition and Public Safety Act of 2005 ("DTV Act")[162] set a firm deadline of February 17, 2009 for the 700 MHz band spectrum to be cleared of analog transmissions and made available for public safety and commercial services as part of the DTV transition. The DTV Act established two specific statutory deadlines for the auction of recovered analog spectrum in the 700 MHz band: (1) the auction must begin no later than January 28, 2008; and (2) the auction proceeds must be deposited in the Digital Television Transition and Public Safety Fund by June 30, 2008.[163] Congress also extended the Commission's auction authority to September 30, 2011.[164] This spectrum is being made available for wireless services, including public safety and commercial services.[165] Although the DTV Act established a date certain for the DTV transition, portions of the 700 MHz band are currently encumbered by television broadcasters, and may remain so until the end of the transition.[166] Nevertheless, there are substantial portions of the band that are not so encumbered and are available for immediate use by new licensees.

698-940 MHz: 700 MHz Band Spectrum



83. In light of the DTV Act, recent developments in the market for commercial wireless communications, and the evolving needs of the public safety community for advanced broadband communications, the Commission revisited its rules governing the 700 MHz band.[167] In 2007, the

[161] *See 700 MHz Second Report and Order.*

[162] *See* Deficit Reduction Act of 2005, Pub. L. No. 109-171, 120 Stat. 4 (2006) ("DRA"). Title III of the DRA is the DTV Act.

[163] *See* DTV Act §§ 3002-04. "Recovered analog spectrum" is defined in the DTV Act. *Id.* § 3003.

[164] *Id.* § 3003(b).

[165] *See 700 MHz Second Report and Order*, 22 FCC Rcd at 15291 ¶ 1, 15295-96 ¶ 14.

[166] *See* Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59), *Report and Order*, 17 FCC Rcd 1022, 1028 ¶ 9 (2002) ("*Lower 700 MHz Report and Order*").

[167] *See* Service Rules for the 698-749746, 747-762 and 777-792 MHz Bands, WT Docket No. 06-150, Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, and Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones, WT Docket No. 01-309, *Notice of Proposed Rule Making, Fourth Further Notice of Proposed Rule Making, and Second Further Notice of Proposed Rule Making*, 21 FCC Rcd 9345 (2006) ("*700 MHz Commercial Services Notice*").

Commission adopted a new band plan and revised certain of the rules relating to the 700 MHz band.[168] The new band plan provides a balanced mix of geographic service area licenses and spectrum blocks sizes for the commercial spectrum that is to be auctioned.[169] The new band plan also includes one spectrum block that will be licensed as part of a Public/Private Partnership entered with a national public safety broadband licensee for the public safety broadband spectrum in the 700 MHz band to promote the development of nationwide interoperable broadband services for public safety users.[170] Licensees for another commercial block of spectrum in the 700 MHz band will be required to allow customers, device manufacturers, third-party application developers, and others to use or develop the devices and applications of their choice, subject to certain conditions.[171]

84. The Commission has scheduled the auction of 700 MHz band licenses, comprising 62 megahertz, for January 24, 2008.[172] The remaining 22 megahertz of commercial spectrum in this band has already been auctioned and licensed. The total 84 megahertz of commercial spectrum in the 700 MHz band will generally be open to a broad range of flexible uses.[173] This spectrum has many permissible

[168] *See 700 MHz Second Report and Order*, 22 FCC Rcd at 15291-95 ¶¶ 1-13; Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, WT Docket No. 06-150, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8064 (2007) ("*700 MHz Report and Order*" and "*700 MHz Further Notice*", respectively).

[169] The Commission changed the location of existing 700 MHz Guard Band licenses, provided for a 1-megahertz shift of the other commercial blocks in the Upper 700 MHz band and in the spectrum allocated to public safety, and reduced the size of the Guard Band B Block to make two additional megahertz of commercial spectrum available for auction. *700 MHz Second Report and Order*, 22 FCC Rcd at 15292-93 ¶ 3. In addition, the Commission afforded all Guard Band A Block licensees the same technical rules that apply to the adjacent commercial spectrum and the ability to deploy cellular architectures. *Id.* at 15294 ¶ 9.

[170] *See 700 MHz Second Report and Order*, 22 FCC Rcd at 15292-93 ¶ 3.

[171] *Id.* ¶ 195. "The Commission has found that the Commercial Mobile Radio Services (CMRS) market is effectively competitive, and that competitive pressures continue to result in the introduction of innovative pricing plans and service offerings. [Footnote omitted.] We have not found, however, that competition in the CMRS marketplace is ensuring that consumers drive handset and application choices, especially in the emerging wireless broadband market." *700 MHz Second Report and Order,* 22 FCC Rcd at 15362-63 ¶ 200. Specifically, the Commission expressed concern that "certain practices in the wireless industry may constrain consumer access to wireless broadband networks and limit the services and functionalities provided to consumers by these networks." *Id.* at 15362 ¶ 198. In adopting the Open Platform requirement to the Upper 700 MHz C Block, the Commission noted: "Although we generally prefer to rely on marketplace forces as the most efficient mechanism for fostering competition, we conclude that the 700 MHz spectrum provides an important opportunity to apply requirements for open platforms for devices and applications for the benefit of consumers, without unduly burdening existing services and markets." *Id.* at 15361 ¶ 195.

[172] Auction of 700 MHz band Licenses Scheduled for January 24, 2008, Notice and Filing Requirements, Minimum Opening Bids, Reserve Prices, Upfront Payments, and Other Procedures for Auctions 73 and 76, *Public Notice*, 22 FCC Rcd 18141 (2007).

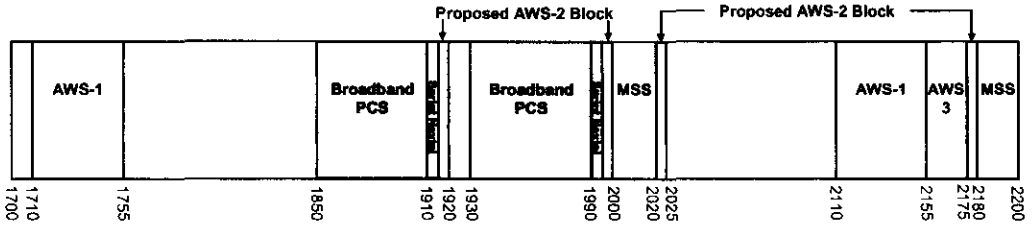
[173] *See Lower 700 MHz Report and Order*; Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, WT Docket No. 99-168, *Third Report and Order*, 16 FCC Rcd 2703 (2001); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, WT Docket No. 99-168, *Second Memorandum Opinion and Order*, 16 FCC Rcd 1239 (2001); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, WT Docket No. 99-168, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 15 FCC Rcd 20845 (2000); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, WT Docket No. 99-168, *Second Report and Order*, 15 FCC Rcd 5299 (2000) ("*Upper 700 MHz Second Report and Order*"); *700 MHz Second Report and Order; 700 MHz Report and Order.* The eighty-two megahertz of spectrum does not include the reconfigured Guard Band B Block spectrum at 775-776/805-806 MHz. *See 700 MHz Second Report and Order*, 22 FCC Rcd at 15294 ¶ 9, 15388-89 ¶¶ 266-69.

uses: new licensees may use the spectrum for fixed, mobile (including mobile wireless commercial services), and broadcast services.[174] In addition, the Commission recently optimized the power rules in the remaining paired spectrum specifically for mobile use.[175] The Commission expects that many of the new technologies to be developed and deployed in this band will support advanced wireless applications.[176]

(v) Advanced Wireless Services

85. U.S. mobile providers have the flexibility to deploy advanced wireless technologies, including those commonly called Third Generation or "3G," that allow them to offer high-speed mobile data services using their existing CMRS spectrum.[177] To further the goal of promoting the deployment of advanced services, the Commission has made efforts to allocate and license additional spectrum suitable for offering AWS.[178] As noted in the *Eleventh Report*, in 2002 the Commission, together with the National Telecommunications and Information Administration ("NTIA"), allocated 90 megahertz of spectrum in the 1710-1755 and 2110-2155 MHz bands that can be used to offer advanced wireless services, including 3G services.[179]

1700-2200 MHz: Advanced Wireless Services Spectrum



86. Subsequently, the Commission completed the process of establishing service rules for the 1710-1755 and 2110-2155 MHz bands. This included a determination that the spectrum could be used for any wireless service that is consistent with the spectrum's fixed and mobile allocations and would be licensed under the Commission's flexible, market-oriented Part 27 rules,[180] and also a band plan that provided for a significant amount of the spectrum to be licensed on a small geographic basis to encourage the participation of small and rural providers in the AWS auction.[181] In 2006, the Commission established procedures for the auction of the 1710-1755 MHz and 2110-2155 MHz bands ("Auction

[174] *See generally id.*

[175] *See 700 MHz Report and Order*, 22 FCC Rcd at 8067-68 ¶ 6.

[176] *See, i.e., Lower 700 MHz Report and Order*, 17 FCC Rcd at 1032 ¶ 20.

[177] 47 C.F.R §§ 20.901(a) and 24.3.

[178] Advanced Wireless Services (AWS) is the collective term we use for new and innovative fixed and mobile terrestrial wireless applications using bandwidth that is sufficient for the provision of a variety of applications, including those using voice and data (such as Internet browsing, message services, and full-motion video) content.

[179] *Eleventh Report*, at 10977. The Commercial Spectrum Enhancement Act, signed into law on December 23, 2004, establishes a Spectrum Relocation Fund to reimburse federal agencies operating on certain frequencies that have been reallocated to non-federal use, including the 1710-1755 MHz band, for the cost of relocating their operations. *See* Commercial Spectrum Enhancement Act, Pub. L. No. 108-494, 118 Stat. 3986, Title II (2004).

[180] *Eleventh Report*, at 10977-10978; 47 C.F.R. Part 27.

[181] *Eleventh Report*, at 10978.

66").[182]

87. In 2006, the Commission also established procedures by which AWS licensees could relocate existing incumbents in the 1710-1755 MHz and 2110-2155 MHz bands to other spectrum. The 1710-1755 MHz band includes incumbent federal government spectrum users, and NTIA is overseeing the coordination with and relocation of these users under the coordination procedures released by the FCC and NTIA in April 2006.[183] The 2110-2155 MHz band includes fixed microwave service licensees and BRS licensees. For the band, the Commission established rules under which other new licensees benefiting from the relocation of an incumbent would share in the costs of the relocation.[184]

88. The Commission held Auction 66 in the third quarter of 2006.[185] Of the 1,122 licenses offered in Auction 66, 104 winning bidders won 1,087 licenses, with net bids of more than $13.7 billion.[186] In April 2007, the Wireless Bureau announced that licensing had been completed for all of the licenses, with the exception of one license subject to a later deadline for the applicant to file a certification to qualify for a Tribal Land Bidding Credit.[187]

89. The Commission has also taken significant steps toward licensing other bands of spectrum for use by AWS. In 2004, the Commission allocated an additional twenty megahertz of spectrum in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz bands ("AWS-2").[188] The Commission additionally released the *AWS-2 Service Rules NPRM*, which sought comment on appropriate service rules for the1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz bands, and also offered some tentative conclusions consistent with existing AWS service rules, such as allowing flexible use of this spectrum and licensing this spectrum under Part 27 of the Commission's rules.

90. In 2005, the Commission designated yet another 20 MHz of spectrum for AWS,

---

[182] *See* Auction of Advanced Wireless Services Licenses Scheduled For June 29, 2006, *Public Notice*, 21 FCC Rcd 4562 (2006); Auction of Advanced Wireless Services Licenses Rescheduled for August 9, 2006, *Public Notice*, 21 FCC Rcd 5598 (2006).

[183] *See* The Federal Communications Commission and the National Telecommunications and Information Administration – Coordination Procedures in the 1710-1755 MHz Band, *Public Notice*, 21 FCC Rcd 4730 (2006).

[184] *See* Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, ET Docket No. 00-258, Services Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Ninth Report and Order and Order*, 21 FCC Rcd 4473 (2006).

[185] The auction started on August 9, 2006 and closed on September 18, 2006. *See* Auction of Advanced Wireless Services Closes: Winning Bidders Announced for Auction 66, Report AUC-06-66-F, *Public Notice*, 21 FCC Rcd 10521 (WTB 2006) ("*Closing PN*"). In Auction 66, the Commission made available 1,122 AWS licenses in the 1710-1755 MHz and 2110-2155 MHz bands ("AWS-1").

[186] *Id.*

[187] *See Wireless Telecommunications Bureau Completes Review of Applications for Licenses for Advanced Wireless Services*, News Release, FCC, Apr. 30, 2007.

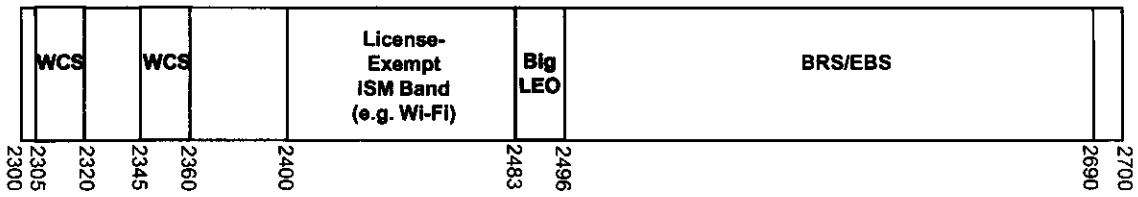
[188] Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, ET Docket No. 00-258, *Sixth Report and Order, Third Memorandum Opinion and Order and Fifth Memorandum Opinion and Order*, 19 FCC Rcd 20720 (2004); Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands; Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 04-356; WT Docket No. 02-353, *Notice of Proposed Rulemaking*, 19 FCC Rcd 19263 (2004) ("*AWS-2 Service Rules NPRM*").

specifically the 2155-2175 MHz band ("AWS-3"), thus establishing 70 MHz of contiguous AWS spectrum in the 2.1 GHz band (from 2110 to 2180 MHz).[189] An application for exclusive use of the spectrum in the 2155-2175 MHz band was filed in 2006, and was accepted for filing in January 2007.[190] Subsequently, six other applicants filed similar applications for use of this AWS-3 spectrum.[191] On August 31, 2007, the Commission released an Order dismissing these seven applications without prejudice and denying two Forbearance Petitions associated with two of the applications, finding that the public interest is best served by first seeking public comment on how the band should be used and licensed.[192] On September 19, 2007, the Commission released a Notice of Proposed Rulemaking, seeking comment on service rules for the AWS-3 spectrum.[193]

(vi) Broadband Radio Service

91. In July 2004, the Commission transformed the rules and policies governing the Multipoint Distribution Service (MDS) and the Instructional Television Fixed Service (ITFS) in the 2500-2690 MHz band by providing licensees with greater flexibility and establishing a more functional band plan.[194] As one part of this action, the Commission renamed the MDS service the "Broadband Radio Service" (BRS) and renamed the ITFS service the Educational Broadband Service (EBS).

2300-2700 MHz: BRS/EBS Spectrum



92. The Commission took several steps to restructure the BRS/EBS band and facilitate more

[189] *See* Amendment of Part 2 of the Commissions Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, ET Docket No. 00-258, *Eighth Report and Order, Fifth Notice of Proposed Rule Making and Order*, 20 FCC Rcd 15866 (2005).

[190] *See* Application of M2Z Networks, Inc. for License and Authority to Provide a National Broadband Radio Service in the 2155-2175 MHz Band (filed May 5, 2006) (M2Z Application). *See* "Wireless Telecommunications Bureau Announces that M2Z Networks, Inc.'s Application for License and Authority to Provide a National Broadband Radio Service in the 2155-2175 MHz Band is Accepted for Filing," WT Docket No. 07-16, *Public Notice*, 22 FCC Rcd 1955 (WTB 2007). *See also* Wireless Telecommunications Bureau Sets Pleading Cycle for Application by M2Z Networks, Inc. to be Licensed in the 2155-2175 MHz Band, WT Docket No. 07-16, *Public Notice*, 22 FCC Rcd 4442 (WTB 2007).

[191] Specifically, there were applications filed by Commnet Wireless, LLC; McElroy Electronics Corp.; NetfreeUS, LLC; NextWave Broadband, Inc.; and Open Range Communications, Inc.; each on Mar. 2, 2007; and by TowerStream Corporation on Mar. 15, 2007. *See* WT Docket No. 07-16.

[192] Applications for License and Authority to Operate in the 2155-2175 MHz Band, WT Docket No. 07-16, *Order*; Petitions for Forbearance Under 47 U.S.C. § 160, *Order*, 22 FCC Rcd 16563 (2007), *recons pending*.

[193] In the Matter of Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band, *Notice of Proposed Rulemaking*, 22 FCC Rcd 17035 (2007).

[194] Amendment of Parts 1, 21, 73, 74, and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational, and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, WT Docket No. 03-66, *Report and Order and Further Notice of Proposed Rulemaking*, 19 FCC Rcd 14165 (2004). The rules for this band were initially established in 1963 but have evolved significantly since that time.

efficient use of the spectrum. First, the Commission expanded the 2500-2690 MHz band by five megahertz, from 2495-2500 MHz, to accommodate the relocation of BRS Channels 1 and 2, which are presently located in the 2.1 GHz band. Specifically, the Commission created a one-megahertz guard band, 2495-2496 MHz, to separate incumbent operations below 2495 MHz and new BRS Channel 1 licensees that would operate at 2496-2502 MHz. Second, the Commission created a new BRS/EBS band plan for the 2496-2690 MHz band that eliminated the use of interleaved channels and created distinct band segments for high power operations, such as one-way video transmission, and low power operations, such as two-way fixed and mobile broadband applications. By grouping high and low power users into separate portions of the band, the new band plan reduces the likelihood of interference caused by incompatible uses and creates incentives for the development of low-power, cellularized broadband operations, which were inhibited by the prior band plan.

93. In addition, the Commission provided licensees with the flexibility to employ the technologies of their choice in the band and to lease spectrum under the Commission's secondary market spectrum leasing policies and procedures. The Commission also implemented geographic area licensing for all licensees in the band, which will allow increased flexibility while reducing administrative burdens on both licensees and the Commission.

94. In April 2006, the Commission continued its transformation of the rules governing BRS and EBS by revising the mechanism for transition from the existing band configuration to the new band plan.[195] BRS and EBS providers will have thirty months from the effective date of the new rules during which they may propose transition plans for relocating existing facilities of all other licensees within the same BTA to new spectrum assignments in the revised band plan. Plan proponents must notify all licensees in the BTA and file their plans with the Commission. As of July 2007, proponents had filed transition plans for 298 of the 493 BTAs, and completed the transition in 50 BTAs.[196]

95. The Commission also allowed licensees to transition themselves if no proponent came forward in a BTA by the deadline for filing transition plans. It also made other changes to the transition rules to facilitate transitions to the new band plan. With respect to lease agreements, the Commission held that EBS licensees are permitted to enter into excess capacity leases for a maximum of 30 years, but leases with terms of 15 years or longer must include a right to review the educational use requirements of the leases every five years starting at year 15.

96. The changes made to the 2496-2690 MHz band should enable BRS/EBS providers to use this spectrum in a more technologically and economically efficient manner. The goal of the new rules is to facilitate the growth of new and innovative wireless technologies and services, including wireless broadband services that have the potential to compete with cable and DSL broadband providers and to extend broadband service to rural and underserved areas.

---

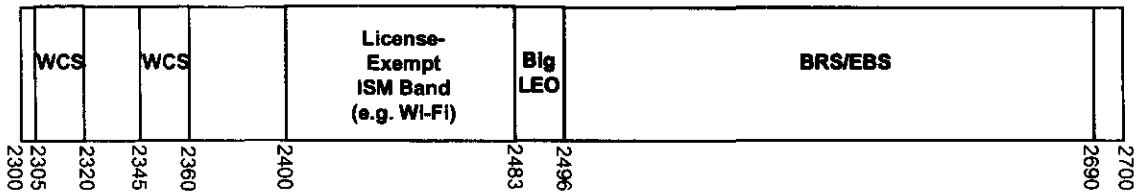
[195] Amendment of Parts 1, 21, 73, 74, and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational, and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, *Order on Reconsideration and Fifth Memorandum Opinion and Order and Third Memorandum Opinion and Order and Second Report and Order*, 21 FCC Rcd 5606 (2006).

[196] *See* Initiation Plans and Post-Transition Notifications filed in WT Docket No. 06-136. *See also* Wireless Telecommunications Bureau Establishes Docket for the Filing of Initiation Plans, Post-Transition Notifications, and Self Transition Notices in the Transition of the 2500-2690 MHz Band, *Public Notice*, 21 FCC Rcd 7909 (2006).

(vii) Wireless Communications Service (WCS)

97. The Commission has licensed 30 megahertz of spectrum in the 2.3 GHz band, at 2305-2320 MHz and 2345-2360 MHz, for the Wireless Communications Service ("WCS"). The WCS spectrum is adjacent to and separated by the spectrum band for the Satellite Digital Audio Radio Service, which is used by XM and Sirius to provide satellite radio service. The service rules governing WCS are flexible, and WCS licensees can use this spectrum to provide a variety of fixed or mobile wireless services. The WCS spectrum was auctioned in 1997 and licensed on a Major Economic Area ("MEA") and Regional Economic Area Grouping ("REAG") basis. As described below, wireless providers have begun using WCS spectrum to deploy wireless broadband services.

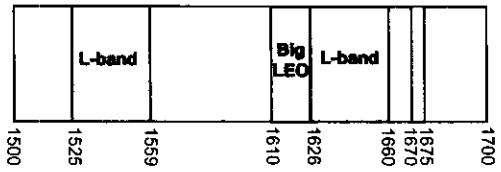
2300-2700 MHz: WCS Spectrum



(viii) 1670-1675 MHz

98. In April 2003, the FCC auctioned five megahertz of unpaired spectrum in the 1670-1675 MHz band as a single, nationwide license. As with the other spectrum bands licensed under Part 27 of the Commission's rules, such as AWS and WCS, the service rules for the 1670-1675 MHz band are flexible, and licensees can use the spectrum to deploy a variety of fixed or mobile wireless services. The license was won at auction by Crown Castle. In July 2007, Crown Castle announced that it had entered into a long-term agreement to lease the spectrum to a venture formed by Telecom Ventures, LLC and Columbia Capital, LLC.[197]

1500-1700 MHz: 1670-1675 MHz Spectrum



(ix) Narrowband Spectrum

99. In addition to the spectrum that mobile telephone providers use to offer both voice and data CMRS services, two additional spectrum bands – paging and narrowband PCS – are used by licensees to offer CMRS services that consist only of data communications. Spectrum designated for commercial messaging/paging is spread across several non-contiguous bands: 35-36 MHz, 43-44 MHz, 152-159 MHz, 454-460 MHz, and 929-932 MHz.[198] Each license consists of between 20 and 50 kilohertz.[199] The Commission first allocated spectrum for paging in 1949 and licensed the spectrum on a

[197] *Crown Castle Announces Long-Term Modeo Spectrum Lease*, News Release, Crown Castle, July 23, 2007; ULS Lease ID L000002305. *See* SectionIII.B.4, Mobile Video Providers, *supra*, for a further discussion of Crown Castle.

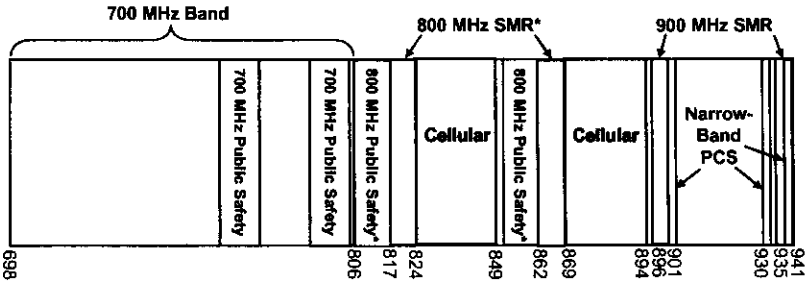
[198] FCC, *Paging (Lower) Bandplan*, <http://wireless.fcc.gov/auctions/data/bandplans/pagingLwrband.pdf>; FCC, *929 and 931 MHz Paging Bandplan*, <http://wireless.fcc.gov/auctions/data/bandplans/auc26bnd.pdf>.

[199] *Id.*

site-by-site basis through the mid-1990s.[200] In 2000 the Commission began auctioning additional paging licenses on a geographic area basis using EAs and MEAs.[201] The Commission completed its third paging auction on May 28, 2003.[202]

100. Narrowband PCS spectrum is located in the 901-902 MHz, 930-931 MHz, and 940-941 MHz bands and allows licensees to offer an array of two-way data services such as text messaging.[203] The Commission first auctioned narrowband PCS spectrum in 1994.[204] Licenses consist of between 50 and 200 kilohertz each and were auctioned on a nationwide, regional, and MTA basis.[205] The Commission completed its most recent auction of narrowband PCS licenses on September 25, 2003.[206]

698-941 MHz: Narrowband PCS Spectrum



2. Non-Regulatory Barriers to Entry

101. There are three basic types of potential non-regulatory entry barriers, each of which captures separate dimensions of the difficulty of entering an industry.[207] The first type consists of the impediment to entry erected by advertising expenditures. Unlike tangible capital, advertising can neither be resold nor otherwise transferred to prospective buyers; such expenditures are irrecoverable or sunk. While the incumbent has already incurred the sunk costs, the entrant has not. Therefore, the entrant has higher incremental cost and incremental risk associated with its decision to enter. The second type of

[200] Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems, Implementation of Section 309(j) of the Communications Act – Competitive Bidding, *Notice of Proposed Rulemaking*, 11 FCC Rcd 3108, 3109-3110 (1996).

[201] *See* 929 and 931 MHz Paging Auction Closes, *Public Notice*, 15 FCC Rcd 4858 (2000); *Seventh Report*, at 13050-13051.

[202] Lower and Upper Paging Bands Auction Closes, *Public Notice*, 18 FCC Rcd 11154 (2003).

[203] Implementation of Section 309(j) of the Communications Act – Competitive Bidding Narrowband PCS, PP Docket No. 93-253, *Third Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 10 FCC Rcd 175 (1994).

[204] Announcing the High Bidders in the Auction of Ten Nationwide Narrowband PCS Licenses; Winning Bids Total $617,006,674, *Public Notice*, PNWL 94-4 (rel. Aug. 2, 1994).

[205] *Id.*; Announcing the High Bidders in the Auction of 30 Regional Narrowband PCS Licenses; Winning Bids Total $490,901,787, *Public Notice,* PNWL 94-27 (rel. Nov. 9, 1994).

[206] Regional Narrowband PCS Spectrum Auction Closes, *Public Notice*, 18 FCC Rcd 19689 (2003); Narrowband PCS Spectrum Auction Closes, *Public Notice*, 18 FCC Rcd 19751 (2003). *See, also, Ninth Report*, at 20636-20637.

[207] *See* William J. Baumol and Robert D. Willig, *Fixed Cost, Sunk Cost, Entry Barriers and Sustainability of Monopoly*, QUARTERLY JOURNAL OF ECONOMICS, Vol. 96, Aug. 1981, at 406-431; Joe S. Bain, *Barriers to New Competition*, 1956, at 55; William S. Comanor and Thomas A. Wilson, *Advertising Market Structure and Performance*, THE REVIEW OF ECONOMICS AND STATISTICS, Vol. 49, Nov. 1967, at 425.

entry barrier arises from economies of scale, which allow firms to lower the cost per unit of producing and distributing a product as the volume of output expands. The more extensive economies of scale are, the larger the minimum efficient scale is relative to the size of the market. Consequently, a nascent firm risks depressing market price by producing at optimal scale. The alternative is to produce at less than minimum cost. Either way, expected profitability is lowered, and entry is dissuaded. The third type of entry barrier, and closely related to the second, is the inability of new firms to borrow sums sufficient to finance efficient start-ups. The inability to borrow sufficiently increases with the larger absolute capital requirement needed to realize minimum cost.

102. All three types of entry barriers have the potential to afford incumbent carriers first-mover advantages over latecomers. Therefore, it is possible that the three types of entry barriers are significant in mobile telephone service. Telecommunications has historically been an industry characterized by large investments in network infrastructure and vast scale economies, suggesting the scale economy and capital requirement barriers are both high. Increasing advertising expenditures by mobile telephone providers as they seek to brand their products suggests that the product differentiation barrier in mobile telephone service is similarly high. In this regard, the *Eleventh Report* noted that the four nationwide operators alone spent a total of $3.5 billion on advertising in 2005,[208] and data provided in Section IV of this report shows that there was a significant increase in advertising spending for wireless telephone services in 2006.[209]

F. Rural Markets

1. Geographical Comparisons: Urban vs. Rural

103. Since the release of the *Sixth Report,*[210] the Commission has attempted to obtain a better understanding of the state of competition below the national level, and particularly in rural areas. The Communications Act does not include a statutory definition of what constitutes a rural area.[211] The Commission used RSAs as a proxy for rural areas for certain purposes, such as the former cellular cross-interest rule and the former CMRS spectrum cap, stating that "other market designations used by the Commission for CMRS, such as [EAs], combine urbanized and rural areas, while MSAs and RSAs are defined expressly to distinguish between rural and urban areas."[212] Since its 2004 Report and Order concerning deployment of wireless services in rural areas, however, the Commission has adopted a "baseline" definition of rural as a county with a population density of 100 persons or fewer per square mile.[213] For this reason, we adopt this same definition to analyze service availability in rural areas in this

---

[208] *Eleventh Report*, at 10998.

[209] *See* Section IV.B.4, Advertising and Marketing, *infra.*

[210] *Sixth Report*, at 13350.

[211] The federal government has multiple ways of defining rural, reflecting the multiple purposes for which the definitions are used. *Eighth Report,* at 14834; Facilitating the Provision of Spectrum-Based Service to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services, *Notice of Proposed Rulemaking*, 18 FCC Rcd 20802 (2003) ("*Rural NPRM*"), at 20808-11.

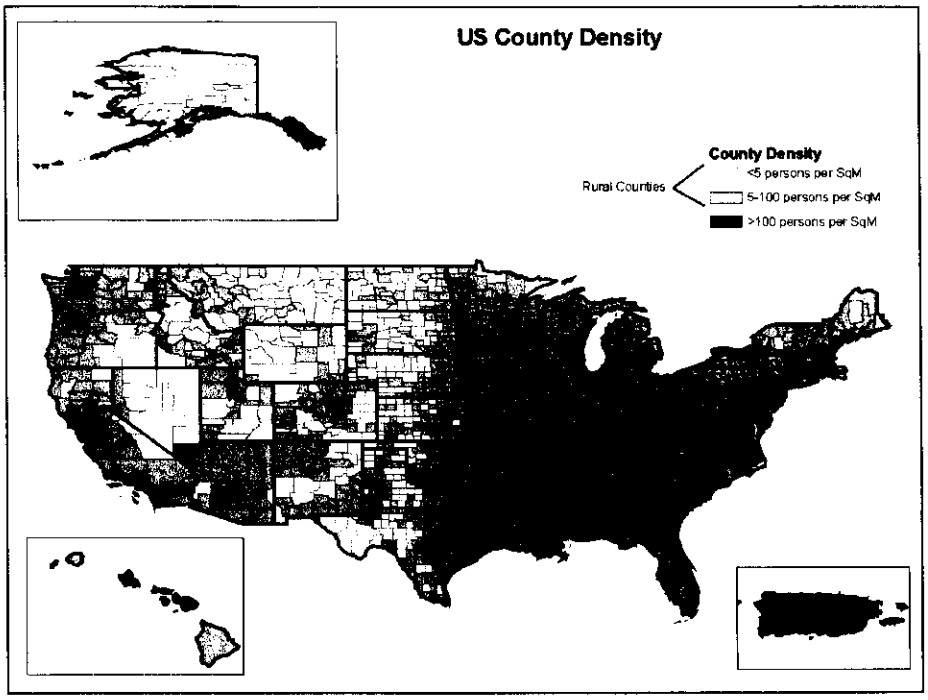
[212] Biennial Regulatory Review, Spectrum Aggregation Limits for Wireless Telecommunications Carriers, *Report and Order*, 15 FCC Rcd 9219, 9256 at note 203 (1999).

[213] Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies To Provide Spectrum-Based Services, *Report and Order*, 19 FCC Rcd. 19078, at 19087-19088 (2004) ("We recognize, however, that the application of a single, comprehensive definition for 'rural area' may not be appropriate for all purposes. . .Rather than establish the 100 persons per square mile or less designation as a uniform definition to be applied in all cases, we instead believe that it is more appropriate to treat this definition as a presumption that will apply for current or future Commission wireless radio service rules, policies and analyses (continued....)

report.

104. By this definition, roughly 61 million people, or 21 percent of the US population,[214] live in rural counties. These counties comprise 3.1 million square miles, or 86 percent of the geographic area of the U.S.[215] The distribution of rural counties across the United States can be seen in the map below.

Map 3: US County Distribution[216]



2. Rural Competition

105. In comparing competitive entry in counties with population densities of 100 persons per square mile or less to those with densities greater than 100 persons per square mile, we find that the less densely populated counties have an average of 3.6 mobile competitors, while the more densely populated counties have an average of 4.3 competitors.[217] The average number of competitors in the less densely

(Continued from previous page)

for which the term 'rural area' has not been expressly defined. By doing so, we maintain continuity with respect to existing definitions of 'rural' that have been tailored to apply to specific policies, while also providing a practical guideline.").

[214] Including the populations of Puerto Rico and the Virgin Islands.

[215] Including the populations of Puerto Rico and the Virgin Islands.

[216] A larger version of this map may be found in Appendix B.

[217] This analysis was done using publicly-available coverage data of mobile telephone providers, not data from American Roamer. In its 2006 Wireless Survey, NTCA found that its "[s]urvey respondents are facing considerable competition from other carriers—the average respondent indicated that their company competes with between three and five other carriers." *NTCA 2006 Wireless Survey Report*, NATIONAL TELECOMMUNICATIONS COOPERATIVE ASSOCIATION, Jan. 2007, available at <http://www.ntca.org/content_documents/2006NTCAWirelessSurveyReport.pdf> (visited Nov. 20, 2007) ("*2006 NTCA Wireless Survey*").